BACTERIN TREATMENT OF SEPTIC RHINITIS OF SCARLET FEVER, WITH REPORT OF ONE HUNDRED CASES.[1]

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Since the exact cause of scarlet fever is unknown, the problem of infection and the illness of the "return case" is very perplexing. Until comparatively recent times the desquamated epithelium was regarded as the chief infectious agent. Gradually the infectious character of discharges from the upper air passages and especially the nose is being recognized. However, until the exact contagium is discovered to explain some of the paradoxes of infection in scarlet fever, the question of infection will always be in doubt. While many of those having considerable experience with the hospital management of scarlet fever may be dubious of the infectiousness of the epithelium of late desquamation, everyone recognizes the danger lurking in discharges from the upper air passages.

In this connection, the report on "return cases "of the Metropolitan Asylums Board[2] of London is of much interest. This report shows that, of 1361 patients discharged from the hospital with some evidence of desquamation, only 94 cases, or 14.5 per cent., were associated with the illness of "return cases," and in the majority of these "infecting cases" another morbid condition co-existed which was sufficient in most instances to account for the illness of the "return case." For instance, in 60 cases a morbid condition of the nose or postnasal region existed. In only 24 cases was desquamation alone present. On the other hand, there were 125 "infecting cases," equivalent to 19.2 per cent., in which apparently no morbid condition, as desquamation or nasal discharges, was present. So that, whatever may be said of the early desquamation, the evidence adduced would seem to show that the late desquamation is not infectious. The same report shows that in 52 per cent. of cases a morbid condition of the nose was the lesion associated with the illness of a "return case." This percentage agrees closely with the records of the Philadelphia Hospital for Contagious Diseases, and emphasizes the important relation between the nasal discharges of convalescents and the spread of scarlet fever.

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[1] Read by invitation before the Philadelphia County Medical Society, April 12, 1911.

[2] Metropolitan Asylums Board. A Report of Return Cases of Scarlet Fever and Diphtheria, Henry Kemmshead, London, 1902, p. 19.

Nasal discharge in scarlet fever patients are usually very persistent and refractory to treatment. While bacterin therapy has been used with success in both acute and chronic rhinitis of non-scarlatinal origin we have not been able to find any reference to its use in the treatment of the rhinitis of scarlet fever. This report is based upon the bacterin treatment of one hundred such cases of septic rhinitis, treated in the scarlet fever wards of the Philadelphia Hospital for Contagious Diseases.

Many patients have discharging noses early in the disease when admitted to the hospital, others develop the condition shortly after admission, but in the large majority of cases this purulent or non-purulent rhinitis develops during convalescence, frequently just preceding dismissal from the hospital. The nose is always most carefully examined by Dr. Woody, chief resident physician, three different times before the patient is permitted to go home, and if only suspicious of discharge the patient is detained in the hospital. In this way the period of residence in the hospital is frequently much prolonged.

It is a difficult matter to adopt a good working classification of these nasal conditions. We have divided them for convenience into purulent and non-purulent rhinitis. The former is characterized by a profuse mucopurulent discharge which produces considerable excoriation about the nostrils and upper lip. The lower turbinates are congested and edematous and covered with this glairy purulent material. Crusts form about the nostrils, and the child invariably picks at these, soon producing a swollen, bleeding, crusty, painful condition. Children under four years of age cannot cleanse their noses by blowing, and irrigation is dangerous and often impossible. Splinting the elbows or tying the hands in mittens to prevent picking, with simple cleansing and the application of protective and soothing ointments, is about all one may do. The course of the disease in the majority of these cases is frequently prolonged and most tedious. Less severe cases show swelling of the turbinates with a small fissure at the mucocutaneous junction, with a thin, watery, scalding discharge.

In the non-purulent cases the turbinates are enlarged and the discharge is profuse, thin, and watery, or mucoid, and irritates the nostrils and upper lip. In the mildest cases there is present a moisture about the anterior nares, with redness and tenderness of the nose. We endeavored to separate ordinary acute colds, in which the discharge is purely mucous, from the rhinitis under discussion, in which the discharge is more apt to be serous or seropurulent, septic, and very irritating in character.

We believe that this rhinitis is, in itself, specifically infectious. Kerr[3] states that "it is undoubtedly infectious from patient to patient and plays a prominent part in the production of the return case." We have noted, on two different occasions, an outbreak of this rhinitis in a convalescent ward of patients with healthy noses, to follow in from two to four days the introduction of a rhinitis case from another ward. Adenoids especially predispose, and these complicated cases resist all treatment. The younger and weaker patients are quite prone to suffer with this septic rhinitis. The warm bath preceding dismissal from the hospital has been a fruitful source by lowering both general and local resistance. Since this has been eliminated by giving the disinfecting bath on the day previous to discharge, fewer cases develop rhinitis prior to discharge or upon reaching their homes.

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[3] Text-book of Infectious Diseases, Oxford Med. Press, first edition, 1909.

What part does nasal discharge play in the etiology of "return cases" of scarlet fever? Some persons believe that these discharges are not infectious *per se*, but rather that the scarlet fever infection is derived from acute cases and engrafted on the patient. Simpson[4] points out "that the infection, the causal microörganisms, appears to acquire activity particularly in the mucous discharges, whether acute or chronic, but further than acting as suitable media for their growth and carriers of any possible infection that may come in contact with them the discharges do not appear to possess infectious properties of themselves."

If the secretion dries up, there is no longer the medium on which the microörganisms can engraft themselves, so that the patient becomes non-infectious.

Others believe that the "infecting case" at the time of dismissal has not entirely eliminated the infection derived from the original attack, and as a consequence the discharges remain infectious. This view is hardly tenable. We are led to agree with the views of Cameron,[5] who believes that the causal microörganisms of scarlet fever lead a saphrophytic existence in the mucous membranes, and when conditions are favorable retain their vitality for a considerable period of time. In most cases the conditions are unfavorable and the infection dies out, but in other cases it may live and retain its vitality, especially upon a mucous membrane impaired either by a general lack of vigor or by a superadded local, septic infection. For this reason an "infecting case" may be one of poor vitality without a local lesion in the nose, and this agrees with the clinical observation that a discharge is not necessary to the patient's infectiousness. This superadded septic infection may be acquired either before or after admission to the hospital by extension of infection from the throat, inhalation of dust, etc. A warm bath followed by chilling of the body may so lower vital resistance as to favor activity of septic organisms in the mucous membranes.

We began the bacterin treatment of these cases with the hope of overcoming this septic infection, and not with the idea of combating the causal agent of scarlet fever itself. We believe that this scarlet fever agent, whatever it may be, will die if the superadded septic infection is removed.

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[4] Metropolitan Asylums Board Report, p. 52.

[5] Ibid, p. 54.

Excellent work has been done on the bacteriology of the normal nose and also of its inflammatory diseases. Our work is confined entirely to these cases of septic rhinitis complicating scarlet fever. We were surprised at first with the great regularity in which staphylococci were found, usually aureus, and practically in pure culture. We felt that possibly our technique was faulty and that some of the organisms might have escaped detection Accordingly the various methods and media which have been advised from time to time for isolation of streptococci, pneumococci, and the influenza and diphtheroid group of bacilli were employed. But, as wlll be seen, our findings include but four organisms: Staphylococcus aureus occurred alone in 89 cases; Staphylococcus albus in 3 cases; a diphtheria-like bacillus in 6 cases; Staphylococcus aureus and a diphtheria-like bacillus occurred together in 1 case; and Staphylococcus aureus and Streptococcus pyogenes were found associated in 1 case.

The staphylococci and Streptococcus pyogenes were isolated and classified according to cultural and biological characteristics. Special attention was given the diphtheria-like organisms because of their relation to the Klebs-Loeffler and Hofmann's bacillus. As will be noted in the tables, they were found in 7 per cent. of the cases. In every instance the organism was of medium length, solid, with rounded or slightly pointed ends, evenly and darkly staining, Gram positive, and in four instances showing a faint median band. Unfiltered bouillon cultures and filtered toxins grown for forty-eight hours were made and injected subcutaneously into guinea-pigs in doses corresponding to 0.5 per cent. of the body weight of the animal expressed in cubic centimeters. All gave negative results. Three cultures were inoculated into tubes containing Hiss serum water media containing 1 per cent. of dextrin, maltose, mannite, lactose, and saccharose respectively. In one case acid was produced in dextrin and maltose, indicating the true diphtheria bacillus, the other two yielded negative results, indicating Hofmann's bacillus.

The following table gives the duration of the septic rhinitis prior to culturing and the first dose of bacterin:

	Cases.
Two to four days	48
Four to seven days	19
Seven to twelve days	16
Twelve to twenty days	6
More than twenty days	11

Cases of nasal discharge were reported to us on the second or third day of discharge. The case was then examined and the question of the advisability of bacterin treatment considered. A culture was then made, and in a large number of cases a dose of stock polyvalent Staphylococcus aureus vaccine was administered at once. In many cases this was the only dose required, but all cases were cultured in order to detect the presence of some organism other than the Staphylococcus aureus. If two organisms were found they were isolated and a separate bacterin of each prepared. The aggregate dose of the two bacterins equalled the usual dose of one. The size of a dose depended upon the general condition of the patient; the younger and weaker receiving correspondingly smaller doses. The initial dose varied from 50,000,000 to 100,000,000 of staphylococci and 50,000,000 to 80,000,000 of the diphtheria-like organism. Succeeding doses were given every five to eight days, depending upon the clinical aspect of the patient. Injections were given in the loose areolar tissue of the back by means of an all-glass sterilized syringe. All other treatment was stopped except cleanliness of the parts and application of soothing ointments. Other infections, toxemia with fever, nephritis, and low vitality were considered contraindications. The following table gives the number of doses administered, with the results obtained:

Doses.	Cases.	Cured.	Improved.	Not improved.	Other infections.
1	43	39	1	2	1
2	29	23	3	1	2
3	12	9	1	2	
4	6	3	1	2	
5	6	2	2	2	
6	3	1	..	2	
7	1	..	..	1	

The temperature reaction following the injection was moderate, reaching 100° to 102° F., and falling to normal in twenty-four to thirty-six hours. We never had an abscess. There is usually a slight local redness and tenderness and general malaise following the injection. In the majority of cases the discharge begins to lessen after twenty-four hours. The congestion of the turbinates was relieved quite promptly, and in two to four days bad cases were well. If no improvement followed three doses, another culture was made and a bacterin prepared. Examination was also made for the presence of adenoids. If these were present, bacterin treatment was stopped, as treatment in such cases has proved to be valueless. In the first few cases of adenoids, extensive treatment was persisted in, but to no avail. All cases were retained in the hospital from four to ten days after the rhinitis had cleared up.

It is a difficult matter to draw an impartial conclusion concerning the value of bacterin treatment in these cases of septic rhinitis. In individual cases the results were most striking, when we naturally expected a prolonged course would follow under ordinary treatment. This rhinitis occurs in from 10 to 20 per cent. of cases and is usually persistent. Many cases heal promptly with usual treatment, but the time required for such a result is very much decreased with bacterin treatment. We have not been able to trace one "return case" which can be attributed directly or remotely to one of the cases that received bacterin treatment.

Examination of the last table shows a cure in 77 per cent. of cases; 8 per cent. were improved, 12 per cent. not improved, and 3 per cent. contracted other infections, and the treatment was stopped. The 8 cases showing improvement had a very slight discharge when dismissed; 9 of the cases not improved had adenoids, and 3 were of poor vitality; 1 patient developed pertussis, 1 Vincent's angina, and 1 acute scarlatinal nephritis. All cases not cured were held at least four weeks over the usual period of residence in the hospital.

For the sake of comparing the efficacy of stock and autogenous bacterins, about an equal number of cases were treated with each. The stock bacterin was made from twelve different cultures of Staphylococcus aureus. All bacterins of the diphtheria-like bacillus and the Streptococcus pyogenes were autogenous.

Cases treated with	Cured.	Improved.	Not improved.	Other infections.
Autogenous bacterins, 52 . .	35	6	10	1
Stock bacterins, 48 . . .	43	2	1	2

All the adenoid cases were treated with autogenous bacterins, which accounts for the apparently better results with the stock bacterins. The results were about equal.

CONCLUSIONS. 1. That nasal discharges are of primary importance in the etiology of the "return case" of scarlet fever.

2. That the true rhinitis of scarlet fever is septic in character, distinctly infectious in itself, and probably harbors the contagium of scarlet fever.

3. That bacterin treatment of cases of septic rhinitis is more satisfactory than the usual treatment. It shortens materially the time required for cure and decidedly aids in decreasing the number of "return cases."

CHRONIC PNEUMONIA (INCLUDING A DISCUSSION OF TWO CASES OF SYPHILIS OF THE LUNG).

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Among the numerous indurative processes in the lung, chronic (unresolved, organizing, or indurative) pneumonia is specially interesting from the high frequency of complications, and especially on account of the irregularity of its clincial symptoms and the